

THE MOLLUSCA OF CHAUTAUQUA LAKE, NEW YORK, WITH
DESCRIPTIONS OF A NEW VARIETY OF PTYCHO-
BRANCHUS AND OF HELISOMA*

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Chautauqua Lake is one of the most interesting physiographic localities in New York State and seems to have been studied the least from a biological standpoint. Only three references occur which give any sort of comprehensive list of the species of Mollusca present, and but one of these (Ortmann) pays particular attention to the lacustrine character of the species. During the early part of August, 1927, a week was spent at the Chautauqua Assembly grounds and a small collection was made of those species that could be obtained from the shore. As no plans had been made for studying the lake, equipment necessary for such work was totally lacking. The success of this incidental shore work indicates that a rich harvest of interesting forms awaits the student who will make modern investigations of this lake fauna in comparison with that found in the outlet, Conewango Creek.

Chautauqua Lake is situated in Chautauqua County in the extreme southwestern part of the state. It is about 22 miles long and some three miles wide at its maximum extension, but is less than a quarter of a mile in one place. While the greatest part of the lake is relatively shallow, there are several places where the water is 60 and 80 feet in depth, the latter between Chautauqua and Long points. The northern part of the lake is shallow, not exceeding 20 feet in depth. The altitude of the lake is 1,338 feet above sea level and more than 700 feet above Lake Erie. It lies at the

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edge of the southwestern plateau province overlooking the Lake Erie plain. A narrow place at the middle of the lake suggests the presence of a preglacial divide which Dr. Tarr suggests (*Physical Geography of New York State*, p. 205) may indicate that the "lake is made up of parts of two valleys, one north-sloping, the other south sloping, and each dammed by heavy morainic accumulations".

The drainage is into the Allegheny River and hence the species belong to the Ohio River drainage and not to the St. Lawrence River, as is the case with the Finger Lakes and other large and small lakes in New York State. A study of the mollusk fauna suggests that the species migrated up the Allegheny River into the lake following the Wisconsin stage of glaciation and there became modified into characteristic lake varieties, in much the same manner as did the faunae now occupying the many lakes in Wisconsin and Michigan. Nearly all species show lake environmental influences, some forms to a greater extent than others. The two varieties believed to be new are doubtless lake variants of normal river types. A study of this lake such as was made of Oneida Lake for the State College of Forestry at Syracuse University by the writer would result in much addition to our knowledge concerning distribution and variation among aquatic species.

The lake is filled with vegetation (*Scirpus*, *Myriophyllum*, *Potamogeton*, *Elodea*, *Ceratophyllum*, etc.) which should support a large fauna of mollusks and insects. What may be found in the deeper parts of the lake can only be surmised. In passing, one wonders why the Chautauqua Institution has not instituted some lake studies along with the courses in nature study yearly given. The lake is admirably adapted for limnological studies and the Institution might render a real service to science by conducting lake work in biology.

Mention should be made of the excellent collection made many years ago by Miss Carlotta J. Maury. The species

were identified before much of our knowledge concerning the variation of species coincident with environment was available. Through the kindness of Dr. P. R. Needham, of Cornell University, the writer has been enabled to examine the collection of mollusks made by Miss Maury in Chautauqua Lake, and deposited in the Museum at Cornell. This is an excellent example of the importance of and great necessity for preserving material upon which papers have been based so that subsequent investigators may reëxamine it when additional studies may be made, as in the present instance. Several doubtful references of species to this lake fauna have in this way been cleared up.

In the course of work upon the collection personally made assistance has been received from Dr. V. Sterki, who identified Sphaeriidae, and Dr. Bryant Walker, who identified the Ferrissia. Mr. W. E. Burnett, of Bradford, Penn., also supplied certain species from the lake. My thanks are due each of these persons for their assistance.

In the following annotated list the species cited by Maury, Evermann, and Ortmann are included, thus bringing down to date all that is at present known concerning the mollusk fauna of the lake.

ELLIPTIO DILATATUS STERKII Grier.

Bemus Point and Celeron (Ortmann); Chautauqua Lake (Evermann, Maury); Celeron (Burnett); Chautauqua Assembly (Baker).

The *dilatatus* of the lake appear to be referable to *sterkii* rather than to the typical form. Of these Ortmann says, "This is a form distinctly inclining towards *sterkii*. It is rather small (longest 79 mm.) is also slightly more swollen than the true *dilatatus*, and has the beaks a little more anterior; but with regard to color, the Chautauqua form does not differ from *dilatatus*" (1919, p. 102). The color of the specimens personally collected varies from the river form to the lake Erie form. Measurements are:

L. 73; H. 37; D. 20 mm. Chautauqua Lake.

L. 72; H. 35; D. 20 mm. Chautauqua Lake.

L. 68; H. 32; D. 20 mm. Chautauqua Lake.

L. 87; H. 46; D. 28 mm. Grier's measurements of *sterkii*.

L. 59; H. 31; D. 18 mm. Grier's measurements of *sterkii*.

Much the same form occurs in Lake Winnebago, Wisconsin, and it would appear that all of these small forms should be referred to *sterkii* as a distinct lake race, varying more or less in color, but agreeing in form. They are all ecological responses to changes of environment from river to lake. The nacre of the Chautauqua Lake form varies from almost white to dark purple.

ANODONTA GRANDIS FOOTIANA Lea.

Anodonta grandis, var. *footiana*, and var. *decora* of Maury's list.

Bemus Point, Griffith Landing, Celeron (Ortmann); Celeron (Burnett); Chautauqua Lake (Evermann, Maury); Chautauqua Assembly (Baker).

Call, in 1885 (p. 11) correctly referred the Chautauqua Lake *Anodonta* to *footiana*. Ortmann (p. 144) refers it to *grandis*, stating in a footnote, however, that it represents a peculiar local race greatly resembling *benedictensis*, but not *footiana*. The lake form is, however, exactly like the *footiana* from the type locality, Lake Winnebago, Wisconsin, although the shell is not quite as thick as in that locality.

STROPHITUS RUGOSUS (Swains).

Chautauqua Lake (Maury); Chautauqua Assembly (Baker).

The Chautauqua Lake *rugosus* is a small form varying toward the race called *rhombicus* by Anthony, but differing from that form in many respects. Only two specimens were collected and these are without beak markings, hence its relationship with other lake varieties is not possible. It most nearly resembles the creek form, which should be

known as *Strophitus rugosus pavonius* (Lea). It is not *undulatus* as thought by Evermann. This is not recorded by Ortmann but is mentioned by Evermann and Maury.

PTYCHOBANCHUS FASCIOLARIS LACUSTRIS var. nov.

Remus Point, Griffith Landing, Celeron (Ortmann); Chautauqua Assembly Grounds (Baker); Celeron (Burnett); Chautauqua Lake (Maury).

Shell differing from typical *fasciolaris* of the Allegheny and Ohio Rivers in being smaller, relatively higher and shorter, the young not as pointed posteriorly and becoming humped when quite small; female shell with a deeper central marsupial sulcus; growth lines more crowded and regular, the green spots in many specimens being on the impressed growth line, with a bare brown space below, marking the shell into regular zones.

L. 77; H. 46; D. 25 mm. Male. Type.

L. 72; H. 43; D. 23 mm. Male. Paratype.

L. 74; H. 41; D. 22.5 mm. Female. Paratype.

L. 68; H. 38; D. 27 mm. Female. Paratype.

Types: Museum Natural History, Univ. Ill., No. Z23779.

Paratypes: Acad. Nat. Sci. Phil., No. 144807.

Ortmann (p. 210) calls attention to the peculiar form of *Ptychobanchus* found in Chautauqua Lake but does not consider it of enough importance for a varietal name. However, it appears quite as important as the forms of other naiades which have become different from the river forms through inhabiting a lake environment. Some specimens greatly resemble forms living in Green River, Kentucky. This naiad is not mentioned by Evermann, though it is the most abundant species in the lake, as far as personal observation is concerned.

LAMPASILIS SILIQUOIDEA ROSACEA (DeKay).

Chautauqua Lake, various localities (Ortmann); Chautauqua Assembly (Baker); Chautauqua Lake (Maury).

The small form of *siliquoides* in this lake is referable to the race *rosacea*, although Ortmann referred them to *luteola* (*siliquoides*), remarking that they varied toward *rosacea* in size, but that other characters were normal (p. 290). The form as a whole is undoubtedly related to *rosacea*, and should be so referred. It is like many forms of this race common in Wisconsin and Michigan. The nacre is dull white with a few specimens showing a pinkish tint. The largest specimen measures: L. 3; H. 45; D. 27 mm. The epidermis is brownish or yellowish green with rather distinct rays in many specimens.

LAMPASILIS VENTRICOSA LURIDA Simpson.

Lake Chautauqua (Ortmann); Chautauqua Assembly (Baker).

Only a few odd valves of a *Lampsilis* referable to this race were collected. These agree with specimens from Wisconsin and Michigan. It can not be referred to typical *ventricosa* of the rivers. *Lurida* is not the same as *canadensis* Lea, that race being a small, peculiarly angled form common in the great lakes. *Lurida* was well characterized by Simpson for the abundant form of *ventricosa* found in all the northern lakes and differing markedly from any form of the river *ventricosa*. Ortmann considered the Chautauqua Lake form typical *ventricosa* (p. 305) but it differs from this in the same characteristics as do the lake forms found in Michigan and Wisconsin.

SPHAERIUM FALLAX Sterki.

Sphaerium simile; *S. striatinum*, var. Chautauqua Lake (Maury); *S. sulcatum* and *striatinum*; Chautauqua Lake (Evermann); Chautauqua Assembly (Baker).

This new species of *Sphaerium* is very abundant in the lake and has been recorded as both *simile* (*sulcatum*) and *striatinum*. Dr. Sterki states that it may also be found in other places in the Great Lakes region, especially in Michigan and Wisconsin. The Chautauqua Lake form is smaller than the average from more northern places.

SPHAERIUM RHOMBOIDEUM (Say).

Chautauqua Lake (Evermann); Chautauqua Assembly (Baker).

Common and uniform in shape. The shore may be fairly strewn with the empty valves of this species after a storm.

MUSCULIUM ROSACEUM (Prime).

Chautauqua Assembly (Baker). One broken valve apparently referable to this species was found in beach material. Dr. Sterki states that there is a single specimen of this specimen in the Carnegie Museum from Chautauqua Lake.

PISIDIUM INDIANENSE Sterki.

A single large fine specimen of this species occurred with other beach debris from the Chautauqua Assembly grounds. Apparently the first record from an eastern locality.

PISIDIUM SCUTELLATUM Sterki.

Chautauqua Lake (Maury). No examples of the small species of this genus were found by the writer. Such doubtless exist, and many species should be found by careful collecting.

VALVATA TRICARINATA (Say).

Chautauqua Lake (Evermann, Maury); Chautauqua Assembly (Baker).

All typical, with three distinct carinae. One specimen occurred in which the central carina was rather faint, indicating a variation toward the variety *perconfusa*.

VALVATA SINCERA NYLANDERI Dall.

Shore of Chautauqua Lake at Assembly grounds on rocks in shallow water. This Valvata appears to be the regularly ribbed form of *sincera* called *nylanderi* by Dall. It is large (H. 3.5; D. 4.5 mm.), the umbilicus is round and deep, and the spire as in the variety from the north. The spire varies considerably in height.

CAMPELOMA DECISUM (Say)

Chautauqua Lake (Evermann, Maury); Chautauqua Assembly (Baker).

Common on the shore in beach debris. The species appears referable to *decisum* having the normal form of embryonic shell characteristic of that species. The apex is entire in most specimens.

AMNICOLA LIMOSA (Say).

Amnicola pallida of Maury's list.

Mouth of Goose Creek (Maury). The set in the Cornell University collection shows some variation, mostly a widening toward the lake variety *porata*.

AMNICOLA LIMOSA PORATA (Say).

Amnicola limosa of Maury's list. Lakeland, Chautauqua Lake (Maury); Chautauqua Assembly, common on rocks near shore in shallow water (Baker).

The lake form is typical *porata*, showing the same sex dimorphism as noted in the variety as found in Wisconsin and Michigan.

AMNICOLA PILSBRYI Walker.

Amnicola granum of Maury's list. Lakewood (Maury); Chautauqua Assembly, on rocks near shore in shallow water (Baker).

PYRGULOPSIS cf. LETSONI (Walker).

Bythinella nickliniana and *attenuata* of Maury's list. Burtis Bay and Sherman Bay (Maury, 31164, 31165, Cornell Univ. Museum).

Seven specimens, two of which appear mature, are in the Cornell collection, which appear to be a form of *letsoni*. They resemble the form as found in the original locality (Goat Island) but differ somewhat from the form found in La Plaisance Bay, Lake Erie, Mich., and in the fossil deposits near Chicago. The Michigan specimens are narrower with lower whorls and deeper sutures and are longer. Not

enough material is at hand to settle this point, but it is probable that some of the forms should be separated to form either species or races of *letsoni*. The largest specimen, from Sherman Bay, measures L. 3.4; D. 1.5 mm.

STAGNICOLA EMARGINATA CANADENSIS (Sowb.).

Limnaea palustris (Evermann). *Limnaea emarginata* and *catascopium* of Maury's list. Lakewood and White's Bay (Maury); Chautauqua Assembly (Baker); Celeron (Burnett).

The large Lymnaeid of Chautauqua Lake appears to be referable to the race called *canadensis* by Sowerby. It is less elongated than the typical form of the race from Michigan but is otherwise similar. All of the lake forms of this type of shell in New York appear to stand about midway between typical *emarginata* as found in Maine, and *canadensis* as it occurs in the northern lakes. The specimens referred to *catascopium* by Miss Maury are immature *canadensis*, the stage before the lip is thickened and the inner lip spread over the columella and forming the emargination. Perhaps the New York lake form should constitute a distinct race representing a response to a large lake environment. It is very abundant in Chautauqua Lake. A few young animals with shells 8 mm. long, were found on rocks near shore in shallow water.

FOSSARIA MODICELLA (Say).

On rocks in shallow water near shore and on wet ground just above the water line, Assembly grounds. Very abundant.

HELISOMA ANTROSA (Conrad).

Planorbis bicarinatus (Evermann and Maury).

Chautauqua Lake (Evermann, Maury); Chautauqua Assembly (Baker); Sherman's Bay and near Outlet (Maury, Cornell coll.).

Abundant along shore on rocks in shallow water. The

antrosa of the lake are not typical of the species as found in the rivers of the south, in which the spire whorls are sunken below the body whorl and the umbilicus is wide and deep. The majority of specimens have a very low axial height combined with great diameter, the spire is almost flat and only the apical whorls are, as a rule, sunken below the general level. The form is very variable, from ecarinate to strongly bicarinate. Many are similar to the *bicarinata* of Lea from the Delaware River near Philadelphia. All are apparently referable to *antrosa*, though a few resemble an unnamed variety found abundantly in northern Wisconsin. This form probably shows the effect of a lake environment on a river species.

HELISOMA CAMPANULATA (Say).

Chautauqua Lake (Evermann, Maury); Prendergast Bay and near Outlet (Maury, Cornell coll.); Chautauqua Assembly (Baker).

The *campanulata* of the lake vary toward the race called *wisconsinensis* by Winslow, having the raised spire so characteristic of that form. One or two specimens from Prendergast Bay (Cornell coll., 31120) have a large axial height. The specimens observed are all rather small. Living individuals were found bordering the shore of the Assembly grounds in shallow water, on rocks and the bottom.

HELISOMA TRIVOLVIS CHAUTAUQUENSIS var. nov.

Chautauqua Lake (Evermann, Maury); Cheney's Point (Maury, Cornell coll.); Chautauqua Assembly (Baker).

Shell smaller than typical *trivolis*, with $3\frac{1}{2}$ whorls, sculpture of coarse, more or less equidistant ribs; spire flattened, whorls in same plane or the coil of the last whorl raised somewhat above the general plane, subangulated at the shoulder; base with narrow but deep umbilicus, showing $2\frac{1}{2}$ whorls, the inner ones slightly subangulated; body whorl sharply angled above at the shoulder; aperture long-

ovate, wider below, angled above, the outer lip slightly effuse; color of shell brownish horn.

H. 10; D. 16.5; Ap. H. 9.7; D. 6.0 mm. Type.

H. 10; D. 15.8; Ap. H. 9.8; D. 6.0 mm. Paratype.

H. 10.1; D. 16.0; Ap. H. 9.9; D. 6.0 mm. Paratype.

H. 10.0; D. 16.2; Ap. H. 9.9; D. 5.9 mm. Paratype.

Types: Museum Natural History, Univ. Ill., No. Z23780.
Paratypes: Acad. Nat. Sci. Phil., No. 144806.

The small size and less number of whorls, the narrow aperture, deeply excavated base and flattened spire distinguish this form of *Helisoma* from *trivolvis*. It somewhat resembles variety *winslowi* from the northern lakes of Wisconsin, having the same number of whorls; but in that race the body whorl is sharply angulated above and below and the shell has a much greater axial height. Nothing exactly like the Chautauqua Lake form has been seen from any lake and it appears to be a *trivolvis* modified by lake conditions. It is very abundant along the shore of the Assembly grounds, the young and immature living on the flat rocks bordering the shore in shallow water.

GYRAULUS DEFLECTUS (Say)

Planorbis deflectus and *hirsutus* of Maury's list. Lakewood, Sherman's Bay, Fluvanna (Maury, Cornell coll.); Chautauqua Assembly (Baker).

On rocks bordering the shore in shallow water. The form varies from a sharply keeled condition of the periphery to subangulated, the latter approaching variety *obliquus* of Dekay. The *hirsutus* listed by Maury are fine adult examples of *deflectus* with the hair-like epidermis well preserved.

GYRAULUS PARVUS (Say).

Lakewood, on stones bordering the shore (Maury, Cornell coll.). Apparently quite typical; compared with specimens from near Philadelphia.

MENETUS EXACUOUS (Say).

Prendergast Bay (Maury, Cornell coll.). Quite typical.

FERRISSIA TARDA (Say).

Ancylus rivularis of Maury's list.

White's Bay (Maury, Cornell coll.); Chautauqua Assembly (Baker).

Common on rocks along shore in shallow water. Dr. Bryant Walker, who kindly examined the specimens, refers the specimens to the eastern form of the species which is not quite typical.

PHYSELLA ANCILLARIA (Say).

Physa ancillaria and *P. heterostropha* of Maury's list.

Chautauqua Lake (Maury, Evermann); Lakewood (Maury, Cornell coll.); Chautauqua Assembly (Baker).

The *Physella* of the lake is somewhat different from the typical form as found in rivers. It is smaller and the spire is more regularly dome-shaped and the peculiar shouldered appearance of the typical form is wanting in the majority of specimens. These were identified as *heterostropha* in Maury's list. The presence of a few large shells which are undoubted *ancillaria* seems to indicate that the species should be referred to typical *ancillaria*. It is very common in the lake.

SUCCINEA RETUSA Lea.

SUCCINEA AVARA Say.

ZONITOIDES NITIDA (Müller).

The three species of land mollusks listed above occurred more or less abundantly along the shore of the Assembly grounds, near the edge of the water.

POLITA DRAPARNALDI (Beck).

A single specimen of this species was found among beach debris north of the wharf of the Assembly grounds. Where it came from is not known.

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 SHERWOOD RAYMOND ROBERTS

 1845-1928

S. Raymond Roberts was born in Philadelphia on August 30, 1845. He was the son of Spencer and Louisa J. Roberts, prominent members of the Society of Friends.

Early in life Mr. Roberts became interested in natural history, and at the age of about twenty-one, he was one of the group of members of the Academy of Natural Sciences of Philadelphia who associated themselves for the study of Mollusca as a Conchological Section (founded December 26, 1866). Mr. Roberts was made Recorder, a position he held for many years.

His first scientific paper was published in 1868, "De-